

AMENDMENTS TO THE CLAIMS

Pursuant to 37 C.F.R. § 1.121, the following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1. (Currently amended) A BDPD-based (Base-band Digital Pre-Distortion) method for improving efficiency of an RF power amplifier, comprising:

(1) Determining structural parameters of a neural network as required and establishing the neural network, inputting modeling data and initial values of network parameters required for establishing the a neural network model of the RF power amplifier;

(2) Propagating forward with the input data and network parameters, calculating the difference between an output value of the neural network and the an expected output value, then propagating backward along the neural network with said difference to correct the network parameters;

(3) Determining whether said difference meets the a specified criterion; if so, outputting the neural network model of the RF power amplifier and going to step (4), otherwise inputting the corrected network parameters to the neural network and going to step (2);

(4) Solving the a pre-distortion algorithm of the RF power amplifier with said neural network model;

(5) Carrying out pre-distortion processing for an input signal of the RF power amplifier with said pre-distortion algorithm and then feeding them the processed input signal to the RF power amplifier.

2. (Currently amended) A BDPD-based method for improving efficiency of RF power amplifier according to claim 1, wherein

 said structural parameters comprise: the a number n of delay items of input signal, the a number r of neural elements on each layer of the neural network, the a number m of layers of the neural network;

 said modeling data comprises: output signal Y(kt), input signal, and delay items of

input signal of the power amplifier;

 said network parameters comprise: weight W_{ijk} and bias b_{ij} ;

 said output signal $Y(KT)$ of the RF power amplifier is the expected output value corresponding to the input signal, *i.e.*, ~~the actual output value of the RF power amplifier corresponding to the input signal.~~

3. (Original) A BDPD-based method for improving efficiency of RF power amplifier according to claim 2, wherein said input signal and said delay items of the input signal are base-band digital signal amplitude $X(KT)$ of the power amplifier and delay items thereof $X[(K-1)T] \dots X[(K-n+1)T]$, respectively.

4. (Currently amended) A BDPD-based method for improving efficiency of RF power amplifier according to claim 3, wherein the number n of delay items of input signal is: $1[[\square]] \leq n \leq [[\square]]10$, the number r of neural elements on each layer of the neural network is: $1[[\square]] \leq r [[\square]] \leq 10$, the number m of layers of the neural network is: $1[[\square]] \leq m [[\square]] \leq 10$.

5. (Original) A BDPD-based method for improving efficiency of RF power amplifier according to claim 2, wherein said input signal and said delay items of input signal are base-band digital signal amplitude $X(KT)$ of the power amplifier and delay items thereof $X[(K-1)T], X[(K-2)T], \dots, X[(K-n+1)T]$ as well as phase $\Phi_{in}(KT)$ of the base-band digital signal and delay items thereof $\Phi_{in}[(K-1)T], \Phi_{in}[(K-2)T], \dots, \Phi_{in}[(K-n+1)T]$; the number of delay items of the input signal comprises the number n_1 of delay items of base-band digital signal amplitude and the number n_2 of delay items of base-band digital signal phase.

6. (Currently amended) A BDPD-based method for improving efficiency of RF power amplifier according to claim 5, wherein the number n_1 of delay items of the base-band digital signal amplitude is: $1[[\square]] \leq n_1 [[\square]] \leq 5$, the number n_2 of the delay items of base-band digital signal phase is: $1[[\square]] \leq n_2 [[\square]] \leq 10$, the number r of neural elements on each layer of the

neural network is: $1 \leq r \leq 10$, the number m of layers of the neural network is: $1 \leq m \leq 10$.

7. (Currently amended) A BDPD-based method for improving efficiency of RF power amplifier according to claim 2, wherein said step (2) further comprises:

(71) Calculating ~~the~~ corresponding intermediate variables V_{ij} of the neural network with network parameters W_{ijk} of each layer of the neural network;

(72) Activating ~~the~~ a function to calculate ~~the~~ an output value Y_{ij} of each neural element in the corresponding neural network through the intermediate variables V_{ij} and the neural elements;

(73) Magnifying the output value of the neural elements on ~~the~~ a last layer of the neural network for m times to obtain ~~the~~ an output value $Y_m(KT)$ of the neural network, herein the value of M being higher than the saturation level of the RF power amplifier;

(74) Calculating the difference between $Y_m(KT)$ and actual output $Y(KT)$ of the RF power amplifier;

(75) Magnifying the difference $e(KT)$ between $Y_m(KT)$ and $Y(KT)$ for -m times and calculating $\Omega(V_{ij})$ with output value V_{ij} of the neural elements on the last layer of the network, herein, $\Omega(v) = d\Psi(v)/dv$;

(76) Multiplying $M_e(KT)$ with $\Omega(V_{ij})$ to obtain δ_{ij} ;

(77) Propagating δ_{ij} backward along the network channel, in which propagating forward is carried out, with current values of network parameters and obtaining the intermediate variables $u_{i1}, u_{i2}, \dots, u_{ir}$;

(78) Calculating intermediate variables $\delta_{i1}, \delta_{i2}, \dots, \delta_{ir}$ with $u_{i1}, u_{i2}, \dots, u_{ir}$ and current network parameters;

Herein, $\delta_{i1}, \delta_{i2}, \dots, \delta_{ir}$ are obtained through multiplying $\Omega(V_{i1}), \Omega(V_{i2}), \dots, \Omega(V_{ir})$ with $u_{i1}, u_{i2}, \dots, u_{ir}$ respectively, said $\Omega(V_{i1}), \Omega(V_{i2}), \dots, \Omega(V_{ir})$ are calculated out with intermediate variable $v_{i1}, v_{i2}, \dots, v_{ir}$;

(79) Updating current network parameters with $\delta_{i1}, \delta_{i2}, \dots, \delta_{ir}$, and calculating c with the following equation: $c = [\sum(\delta_{i1}^2 + \delta_{i2}^2 + \dots + \delta_{ir}^2) + \delta_{ij}^2]^{1/2}$;

Wherein when updating the current network parameters, the updated network parameters W_{ijk} and b_{ij} are calculated out as follows:

W_{ijk} = value of network parameter before update - $\eta \times \delta_{ij} \times$ output value of corresponding neural elements, herein η is the searching step length;

b_{ij} = value of network parameter before update - $\eta \times \delta_{ij}$.

8. (Original) A BDPD-based method for improving efficiency of RF power amplifier according to claim 7, wherein said step (3) comprises: determining whether c meets the criterion; if so, outputting the neural network model of the RF power amplifier, otherwise inputting the corrected network parameters W_{ijk} and b_{ij} to the neural network and going to step (71).

9. (Original) A BDPD-based method for improving efficiency of RF power amplifier according to claim 7, wherein said $K = 2 \times$ mean gain k_b of RF power amplifier.

10. (Currently Amended) A BDPD-based method for improving efficiency of RF power amplifier according to claim 2, wherein the a bandwidth of said input signal is wider than that of actual input signal of RF power amplifier.